

WO 2004/034733

PCT-Application WO PCT/IB02/04162

Applicant / Owner: Nokia Corporation

Title: Sound generating apparatus having enhanced frequency...

Our Ref.: 51154 WO (KG/TP)

Amended Claims

1. Sound generating apparatus comprising:

- a first cavity (110);
 - a second cavity (120); and
 - an electro-mechanical transducer (100),
said electro-mechanical transducer (100) exciting sound waves in said first cavity (110)
and said second cavity (120);
 - a third cavity (130), wherein said third cavity (130) is connected to said first cavity (110)
via at least one first passage (115) of predefined shape, and said third cavity (130) is
connected to said second cavity (120) via at least one second passage (125) of predefined
shape,
said third cavity (130) having one or more outlets (150) allowing to radiate sound waves
(160) into the exterior;
- wherein said sound generating apparatus provides for acoustical amplification in a low
frequency range;
characterized in that said sound generating apparatus also provides for acoustical
amplification in a high frequency range; wherein said high frequency range amplification is
in a frequency range between 850 Hz and 7 kHz.

2. Apparatus according to claim 1, wherein said high frequency range amplification serves for
acoustical amplification in a frequency range between 950 Hz and 7 kHz.

3. Apparatus according to claim 2, wherein said high frequency range amplification serves for
acoustical amplification in a frequency range between 2 kHz and 7 kHz.

4. Apparatus according to any one of the preceding claims, wherein said high frequency range
includes at least one acoustic resonance, which serves for acoustic amplification.

5. Apparatus according to any one of the preceding claims, wherein said sound generating
apparatus is adapted to a perceptible frequency range of human organs of hearing, which
ranges approximately from 20 Hz to 18 kHz.

6. Apparatus according to any one of the preceding claims, wherein said electro-mechanical transducer (100) has a main direction (185) for emitting sound and a supplementary direction (190) for emitting sound, wherein sound waves emitted along said main direction (185) are radiated into said first cavity (110) and sound waves emitted along said supplementary direction (190) are radiated into said second cavity (120).
7. Apparatus according to any one of the preceding claims, wherein said first cavity (110) has a first volume and said second cavity (120) has an essentially bigger second volume.
8. Apparatus according to any one of the preceding claims, wherein said first cavity (110) and said third cavity (130) have substantially an approximately same volume.
9. Apparatus according to any one of the preceding claims, wherein said first cavity (110) and said second cavity (120) are arranged adjacent to each other, wherein said first cavity (110) and said second cavity (120) are spatially separated from each other by said electro-mechanical transducer (100).
10. Apparatus according to any one of the preceding claims, wherein said electro-mechanical transducer (100) is a loudspeaker.
11. Apparatus according to any one of the preceding claims, wherein said apparatus is suitable for being implemented in a portable electric device (200).
12. Mobile electric device comprising a sound generating apparatus comprising:
 - a first cavity (110);
 - a second cavity (120); and
 - an electro-mechanical transducer (100),
said electro-mechanical transducer (100) exciting sound waves in said first cavity (110) and said second cavity (120);
 - a third cavity (130), wherein said third cavity (130) is connected to said first cavity (110) via at least one first passage (115) of predefined shape, and said third cavity (130) is connected to said second cavity (120) via at least one second passage (125) of predefined shape,
said third cavity (130) having one or more outlets (150) allowing to radiate sound waves (160) into the exterior;wherein said sound generating apparatus provides for acoustical amplification in a low frequency range;

characterized in that said sound generating apparatus also provides for acoustical amplification in a high frequency range; wherein said high frequency range amplification is located in a frequency range between 850 Hz and 7 kHz.

5 13. System for generating sound comprising:

- a first cavity (110);
- a second cavity (120); and
- an electro-mechanical transducer (100),
said electro-mechanical transducer (100) exciting sound waves in said first cavity (110)
10 and said second cavity (120);
- a third cavity (130), wherein said third cavity (130) is connected to said first cavity (110)
via at least one first passage (115) of predefined shape, and said third cavity (130) is
connected to said second cavity (120) via at least one second passage (125) of predefined
shape,
15 said third cavity (130) having one or more outlets (150) allowing to radiate sound waves
(160) into the exterior;

wherein said sound generating apparatus provides for acoustical amplification in a low frequency range;

20 characterized in that said sound generating apparatus provides also for acoustical amplification in a high frequency range; wherein said high frequency range amplification is located in a frequency range between 850 Hz and 7 kHz.